

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

Claim 1 (original): In a thermal swing adsorption process for the removal of contaminant from a gas stream, said process comprising a repeating cycle of steps including:

- (i) contacting the gas stream with an adsorbent selective for the retention of a contaminant in order to adsorb at least a portion of the contaminant from the gas stream wherein this step (i) is conducted at an initial temperature;
- (ii) heating the adsorbent to a first regeneration temperature in order to desorb at least a portion of the contaminant adsorbed in step (i); and
- (iii) cooling the adsorbent to the initial temperature before starting a new cycle;

the improvement comprising a periodic heating step wherein the adsorbent is periodically heating to a second regeneration temperature greater than the first regeneration temperature.

Claim 2 (original): The process of Claim 1 wherein the first regeneration temperature ranges from 40 to 200°C and the second regeneration temperature ranges from 200 to 400°C.

Claim 3 (original): The process of Claim 1 wherein the second regeneration temperature is at least 50°C higher than the first regeneration temperature.

Claim 4 (original): The process of Claim 1 wherein the periodic heating step is conducted just prior to start-up.

Claim 5 (original): The process of Claim 1 wherein the periodic heating step is conducted just after a plant upset.

Claim 6 (original): The process of Claim 1 wherein the frequency of the periodic heating step is triggered by a threshold level of CO<sub>2</sub> breakthrough.

Claim 7 (original): The process of Claim 1 wherein the adsorbent comprises a zeolite and the contaminant comprises CO<sub>2</sub>.

Claim 8 (original): The process of Claim 7 wherein step (ii) involves contacting the adsorbent with a flow of regeneration gas having a linear velocity of at least 0.1 ft/sec.

Claim 9 (currently amended): The process of Claim 8 wherein ~~step~~ the regeneration gas is a dry N<sub>2</sub> rich gas.

Claim 10 (original): The process of Claim 7 wherein the contaminant further comprises N<sub>2</sub>O.

Claim 11 (original): The process of Claim 10 where the adsorbent comprises a first layer of NaX zeolite for the removal of the CO<sub>2</sub> contaminant and a second layer of CaX zeolite for the removal of the N<sub>2</sub>O contaminant.

Claim 12 (original): The process of Claim 1 wherein the adsorbent is layered over a layer of desiccant.

Claim 13 (original): The process of Claim 1 wherein the process produces a dry and contaminant free gas air stream that is subsequently distilled into its constituent components in a cryogenic air separation unit.